

Abstract

Gas-phase methods and systems for reducing NOx emissions and other contaminants in exhaust gases, and industrial processes using the same, are disclosed. In accordance with the present invention, hydrocarbon(s) autoignite and autothermally heat an exhaust gas from an industrial process so that NH₃, HNCO or a combination thereof are effective for selectively reducing NOx autocatalytically. Preferably, the reduction of NOx is initiated/driven by the autoignition of hydrocarbon(s) in the exhaust gas. Within the temperature range of about 900-1600°F, the introduced hydrocarbon(s) autoignite spontaneously under fuel-lean conditions of about 2-18% O₂ in the exhaust gas. Once ignited, the reactions proceed autocatalytically, heating the exhaust gas autothermally. Under some conditions, a blue chemiluminescence may be visible.

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